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| 10/810,902 | 03/29/2004 | Hiroto Yukawa | 2004-0499 | 1092 |

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EXAMINER

LEE, SIN J

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| ART UNIT | PAPER NUMBER |
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1752

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,902

Applicant(s)

YUKAWA ET AL.

Examiner

Sin J. Lee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/376,304.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. Applicants canceled claims 5-9, and thus previous 103(a) rejection on those claims over Takemura et al'739 in view of Yoshimoto (EP'032) and Suwa et al'504 is now moot.
2. Due to Terminal Disclaimer filed on July 8, 2005, previous double patenting rejection on claims 5,6 and 8-10 over U.S. Pat.'553 is hereby withdrawn.
3. In view of newly cited prior arts, the following rejections are made non-final.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being obvious over Oomori et al (US 6,387,587 B1) in view of Yoshimoto et al (EP 0 540 032 A1).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the

application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

In claim 1, Oomori teaches the following:

1. A positive-working chemical-amplification photoresist composition which comprises, as a uniform solution in an organic solvent:

(A) 100 parts by weight of a copolymeric resin consisting of from 50 to 85% by moles of (a) hydroxyl group-containing styrene units, from 15 to 35% by moles of (b) styrene units and from 2 to 20% by moles of (c) acrylate or methacrylate ester units each having a

solubility-reducing group capable of being eliminated in the presence of an acid;

(B) from 1 to 20 parts by weight of a radiation-sensitive acid-generating agent which is bis(4-*tert*-butylphenyl) iodonium nonafluorobutane sulfonate; and

(C) an amine compound selected from the group consisting of secondary amines and tertiary amines in an amount in the range from 0.001 to 10 parts by weight per 100 parts by weight of the component (A).

Oomori also teaches (see claims 2 and 3) *t*-butyl group as the solubility-reducing group of claim 1. Also, since Oomori teaches that there can be 15-35% by moles of styrene units, one of ordinary skill in the art would immediately envisage using 15% by moles of styrene units since "15" is clearly disclosed as the lower end of the taught range.

Oomori also teaches the use of an organic solvent to dissolve those components shown above (see Example 1). Therefore, Oomori teaches present invention of claim 10 except for the present component (C).

Yoshimoto et al, a prior art which also teaches a positive type photoresist composition comprising a resin having anti-alkali-dissolution groups in the molecules

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(which becomes alkali soluble by a reaction with acid), a photoacid generating compound, teaches (pg.3, lines 16-24) that the adhesiveness of a resist to a substrate is markedly improved by adding organic phosphorus acid compound to the photoresist in an amount of 0.001 to 10wt% (based on the weight of the resin). As preferred examples for the organic phosphorous compound, Yoshimoto teaches (pg.9, lines 43-45) phenylphosphinic acid as well as phenylphosphonic acid (see Table 1 on pg.16). Since Oomori coats his photoresist composition onto a semiconductor silicon wafer (see Example 1) (and since Yoshimoto also teaches a silicon substrate in pg.10, lines 15-16), it would have been obvious to one skilled in the art to add an organic phosphorus acid compound such as phenylphosphinic acid or phenylphosphonic acid to Oomori's photoresist composition in order to improve the adhesiveness of the resist to a substrate as taught by Yoshimoto et al. Also, since the taught amount for the phosphorus acid compound to be added overlaps with the presently claimed range, the prior art's range would have made the present range prima facie obvious. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Oomori in view of Yoshimoto would render obvious present inventions of claims 10-13. With respect to present claim 14, claims 13-14 of Oomori teaches triethanolamine as the amine compound. Therefore, Oomori in view of Yoshimoto would render obvious present invention of claim 14.

6. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being obvious over Oomori et al (US 6,255,041 B1) in view of Yoshimoto et al (EP 0 540 032 A1) and Suwa et al (6,187,504 B1).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

In claim 1, Oomori teaches the following:

1. A method for the formation of a patterned resist layer on a substrate surface which comprises the steps of:
 - (1) forming, on the surface of a substrate, a coating layer of a positive-working chemical amplification photoresist composition comprising, as a uniform solution in an organic solvent:
 - (A) a copolymeric resin consisting of (a) from 50 to 85% by moles of hydroxyl group-containing styrene units, (b) from 15 to 35% by moles of styrene units and (c) from 2 to 20% by moles of acrylate or methacrylate ester units each having a solubility-reducing group capable of being eliminated in the presence of an acid, the total of the molar fractions of the monomeric units (a), (b) and (c) being 100%; and
 - (B) a radiation-sensitive acid-generating agent which is an onium salt containing a fluoroalkyl sulfonate ion having 1 to 10 carbon atoms as the anion;
 - (2) subjecting the coating layer to a first heat treatment at a temperature in the range from 120° C. to 140° C.
 - (3) exposing the coating layer pattern-wise to actinic rays;
 - (4) subjecting the coating layer to a second heat treatment at a temperature in the range from 110° C. to 130° C., the temperature of the second heat treatment being lower than the temperature of the first heat treatment; and
 - (5) subjecting the coating layer to a development treatment.

Oomori also teaches (see claims 5 and 6) *t-butyl group* as the solubility-reducing group of claim 1. Also, since Oomori teaches that there can be 15-35% by moles of styrene units, one of ordinary skill in the art would immediately envisage using 15% by moles of styrene units since "15" is clearly disclosed as the lower end of the taught range.

Oomori also teaches the use of an organic solvent to dissolve those components shown above (see Example 1). Therefore, Oomori teaches present invention of claim 10 except for the present components (C) and (D).

Yoshimoto et al, a prior art which also teaches a positive type photoresist composition comprising a resin having anti-alkali-dissolution groups in the molecules (which becomes alkali soluble by a reaction with acid), a photoacid generating compound, teaches (pg.3, lines 16-24) that the adhesiveness of a resist to a substrate

is markedly improved by adding organic phosphorus acid compound to the photoresist in an amount of 0.001 to 10wt% (based on the weight of the resin). As preferred examples for the organic phosphorous compound, Yoshimoto teaches (pg.9, lines 43-45) phenylphosphinic acid as well as phenylphosphonic acid (see Table 1 on pg.16). Since Oomori coats his photoresist composition onto a semiconductor silicon wafer (see Example 1) (and since Yoshimoto also teaches a silicon substrate in pg.10, lines 15-16), it would have been obvious to one skilled in the art to add an organic phosphorus acid compound such as phenylphosphinic acid or phenylphosphonic acid to Oomori's photoresist composition in order to improve the adhesiveness of the resist to a substrate as taught by Yoshimoto et al. Also, since the taught amount for the phosphorus acid compound to be added overlaps with the presently claimed range, the prior art's range would have made the present range prima facie obvious. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Oomori in view of Yoshimoto would render obvious present component (C).

With respect to present component (D), Suwa et al, a prior art which teaches (col.2, lines 14-55) a positive-tone radiation sensitive resin composition comprising a photoacid generator, alkali-soluble resin and an alkali solubility control agent, teaches (col.28, lines 30-58) the use of a Lewis base additive (which exhibits an action as a Lewis base to the acid produced from the acid generator) such as nitrogen-containing basic compounds in order to improve perpendicularity of resist pattern side walls. Since Oomori's photoresist composition also comprises a photoacid generator, it would have been obvious to one skilled in the art to add a nitrogen-containing basic compound to

Oomori's resist composition in order to improve perpendicularity of resist patterns side walls as taught by Suwa et al. As examples for the nitrogen-containing basic compounds, Suwa teaches amine compounds, imidazole compounds, pyridine compound and nitrogen-containing heterocyclic compounds, and Suwa includes triethylamine, tributylamine, as well as triethanolamine as more specific examples for the amine compound. Based on Suwa's teaching, it would have been obvious to one of ordinary skill in the art to add triethylamine, tributylamine, or triethanolamine into Oomori's resist composition with a reasonable expectation of improving perpendicularity of resist pattern side walls as taught by Suwa et al. Therefore, Oomori in view of Suwa would render obvious present component (D) (since Suwa teaches (col.28, lines 59-61) the amount of the Lewis base additive, which exhibits an action as a Lewis base to the acid produced from the acid generator, to be 0.05-1 mol for 1 mol of the acid generator, it is the Examiner's position that the prior art teaches the use of present component (D) in an amount sufficient to exhibit an acid quenching effect). Therefore, Oomori in view of Yoshimoto and Suwa would render obvious present inventions of claims 10-14.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 10-14 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1, 13 and 14 of U.S. Patent No. 6,387,587 B1 in view of Yoshimoto et al (EP 0 540 032 A1).

In claim 1, Pat.'587 teaches the following:

1. A positive-working chemical-amplification photoresist composition which comprises, as a uniform solution in an organic solvent:

(A) 100 parts by weight of a copolymeric resin consisting of from 50 to 85% by moles of (a) hydroxyl group-containing styrene units, from 15 to 35% by moles of (b) styrene units and from 2 to 20% by moles of (c) acrylate or methacrylate ester units each having a

solubility-reducing group capable of being eliminated in the presence of an acid;

(B) from 1 to 20 parts by weight of a radiation-sensitive acid-generating agent which is bis(4-tert-butylphenyl) iodonium nonafluorobutane sulfonate; and

(C) an amine compound selected from the group consisting of secondary amines and tertiary amines in an amount in the range from 0.001 to 10 parts by weight per 100 parts by weight of the component (A).

Pat.'587 also teaches (see claims 2 and 3) *t-butyl group* as the solubility-reducing group of claim 1. Also, since Pat.'587 teaches that there can be 15-35% by moles of styrene units, one of ordinary skill in the art would immediately envisage using 15% by moles of styrene units since "15" is clearly disclosed as the lower end of the taught range. Therefore, Pat.'587 teaches present invention of claim 10 except for the present component (C).

Yoshimoto et al, a prior art which also teaches a positive type photoresist composition comprising a resin having anti-alkali-dissolution groups in the molecules

(which becomes alkali soluble by a reaction with acid), a photoacid generating compound, teaches (pg.3, lines 16-24) that the adhesiveness of a resist to a substrate is markedly improved by adding organic phosphorus acid compound to the photoresist in an amount of 0.001 to 10wt% (based on the weight of the resin). As preferred examples for the organic phosphorous compound, Yoshimoto teaches (pg.9, lines 43-45) phenylphosphinic acid as well as phenylphosphonic acid (see Table 1 on pg.16). Based on Yoshimoto's teaching, it would have been obvious to one skilled in the art to add an organic phosphorus acid compound such as phenylphosphinic acid or phenylphosphonic acid to Pat.'587's photoresist composition in order to improve the adhesiveness of the resist to a substrate as taught by Yoshimoto et al. Also, since the taught amount for the phosphorus acid compound to be added overlaps with the presently claimed range, the prior art's range would have made the present range prima facie obvious. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Pat.'587 in view of Yoshimoto would render obvious present inventions of claims 10-13. With respect to present claim 14, claims 13-14 of Pat.'587 teaches triethanolamine as the amine compound. Therefore, Pat.'587 in view of Yoshimoto would render obvious present invention of claim 14.

9. Claims 10-14 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5, and 6 of U.S. Patent No. 6,255,041 B1 in view of Yoshimoto et al (EP 0 540 032 A1) and Suwa et al (6,187,504 B1).

In claim 1, Pat.'041 teaches the following:

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1. A method for the formation of a patterned resist layer on a substrate surface which comprises the steps of:
- (1) forming, on the surface of a substrate, a coating layer of a positive-working chemical-amplification photoresist composition comprising, as a uniform solution in an organic solvent:
 - (A) a copolymeric resin consisting of (a) from 50 to 85% by moles of hydroxyl group-containing styrene units, (b) from 15 to 35% by moles of styrene units and (c) from 2 to 20% by moles of acrylate or methacrylate ester units each having a solubility-reducing group capable of being eliminated in the presence of an acid, the total of the molar fractions of the monomeric units (a), (b) and (c) being 100%; and
 - (B) a radiation-sensitive acid-generating agent which is an onium salt containing a fluoroalkyl sulfonate ion having 1 to 10 carbon atoms as the anion;
 - (2) subjecting the coating layer to a first heat treatment at a temperature in the range from 120° C. to 140° C.
 - (3) exposing the coating layer pattern-wise to actinic rays;
 - (4) subjecting the coating layer to a second heat treatment at a temperature in the range from 110° C. to 130° C., the temperature of the second heat treatment being lower than the temperature of the first heat treatment; and
 - (5) subjecting the coating layer to a development treatment.

Pat.'041 also teaches (see claims 5 and 6) *t-butyl group* as the solubility-reducing group of claim 1. Also, since Pat.'041 teaches that there can be 15-35% by moles of styrene units, one of ordinary skill in the art would immediately envisage using 15% by moles of styrene units since "15" is clearly disclosed as the lower end of the taught range. Therefore, Pat.'041 teaches present invention of claim 10 except for the present components (C) and (D).

Yoshimoto et al, a prior art which also teaches a positive type photoresist composition comprising a resin having anti-alkali-dissolution groups in the molecules (which becomes alkali soluble by a reaction with acid), a photoacid generating compound, teaches (pg.3, lines 16-24) that the adhesiveness of a resist to a substrate is markedly improved by adding organic phosphorus acid compound to the photoresist

in an amount of 0.001 to 10wt% (based on the weight of the resin). As preferred examples for the organic phosphorous compound, Yoshimoto teaches (pg.9, lines 43-45) phenylphosphinic acid as well as phenylphosphonic acid (see Table 1 on pg.16). Based on Yoshimoto's teaching, it would have been obvious to one skilled in the art to add an organic phosphorus acid compound such as phenylphosphinic acid or phenylphosphonic acid to Pat.'041's photoresist composition in order to improve the adhesiveness of the resist to a substrate as taught by Yoshimoto et al. Also, since the taught amount for the phosphorus acid compound to be added overlaps with the presently claimed range, the prior art's range would have made the present range prima facie obvious. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Pat.'041 in view of Yoshimoto would render obvious present component (C).

With respect to present component (D), Suwa et al, a prior art which teaches (col.2, lines 14-55) a positive-tone radiation sensitive resin composition comprising a photoacid generator, alkali-soluble resin and an alkali solubility control agent, teaches (col.28, lines 30-58) the use of a Lewis base additive (which exhibits an action as a Lewis base to the acid produced from the acid generator) such as nitrogen-containing basic compounds in order to improve perpendicularity of resist pattern side walls. Since Pat.'041's photoresist composition also comprises a photoacid generator, it would have been obvious to one skilled in the art to add a nitrogen-containing basic compound to Pat.'041's resist composition in order to improve perpendicularity of resist patterns side walls as taught by Suwa et al. As examples for the nitrogen-containing basic compounds, Suwa teaches amine compounds, imidazole compounds, pyridine

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compound and nitrogen-containing heterocyclic compounds, and Suwa includes triethylamine, tributylamine, as well as triethanolamine as more specific examples for the amine compound. Based on Suwa's teaching, it would have been obvious to one of ordinary skill in the art to add triethylamine, tributylamine, or triethanolamine into Pat.'041's resist composition with a reasonable expectation of improving perpendicularity of resist pattern side walls as taught by Suwa et al. Therefore, Pat.'041 in view of Suwa would render obvious present component (D) (since Suwa teaches (col.28, lines 59-61) the amount of the Lewis base additive, which exhibits an action as a Lewis base to the acid produced from the acid generator, to be 0.05-1 mol for 1 mol of the acid generator, it is the Examiner's position that the prior art teaches the use of present component (D) in an amount sufficient to exhibit an acid quenching effect). Therefore, Pat.'041 in view of Yoshimoto and Suwa would render obvious present inventions of claims 10-14.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

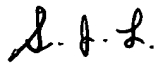
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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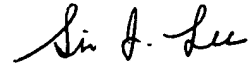
published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
September 26, 2005



SIN LEE
PRIMARY EXAMINER